



Practitioner's Docket No.: 791\_119

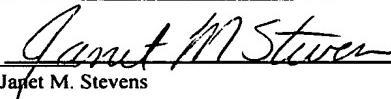
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Li YANG, Toshihiro YOSHIDA, and Hiroshi NEMOTO  
Ser. No.: 09/686,408 Group Art Unit: 1745  
Filed: October 11, 2000 Examiner: Gregg Cantelmo  
Confirmation No.: 1042

For: LITHIUM SECONDARY BATTERY

I hereby certify that this paper is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 addressed to Assistant Commissioner for Patents, Washington, D.C. 20231 on Feb. 3, 2003 under "EXPRESS MAIL" mailing label number EV 263613606 US.

  
Janet M. Stevens

Assistant Commissioner for Patents  
Washington, DC 20231

DECLARATION UNDER 37 CFR §1.132

Sir:

I, Toshihiro Yoshida, a citizen of Japan hereby declare and state:

1. I have a bachelor's degree in science which was conferred upon me by Tokyo University of Science in Tokyo, Japan, in 1988.
2. I have been employed by NGK INSULATORS, LTD. since 1988 and I have had a total of 5 years of work and research experience in the field of batteries, including lithium secondary batteries.
3. I am a co-inventor of the above-identified patent application and I am familiar with the references applied in the Office Action mailed October 1, 2002.

4. My publication includes the following work in this field: 'A model of capacity fade caused by a reaction rate between electrolyte and intercalated Li in carbon in Li-ion battery', Proceeding of The 43rd Battery Symposium in Japan (2002).

5. The following experiment was conducted by me or under my direct supervision.

#### Purpose of Experiment

The purpose of this experiment is to show the proof that JP'631 cell can contain water and HF in a total concentration of more than 10,000 ppm in the battery.

#### Experimental

A  $\text{LiMn}_2\text{O}_4$  spinel was used as the positive electrode active substance. The  $\text{LiMn}_2\text{O}_4$  spinel powder was mixed with acetylene black as a conductivity-improving agent, a solvent and a binder to produce a slurry for the positive electrode. The slurry was coated on both sides of an aluminum foil of 20  $\mu\text{m}$  in thickness so that the slurry thickness became about 100  $\mu\text{m}$  on each side to produce a positive electrode. Similarly, a negative electrode was produced by using a carbon powder as a negative electrode active substance and coating both sides of a copper foil of 10  $\mu\text{m}$  in thickness so that the coating thickness became about 80  $\mu\text{m}$  on each side. Using the positive electrode, the negative electrode and a separator made of a cellulose system polymer e.g., paper, a wound type electrode body was produced. The electrode body was placed in a case; then, a non-aqueous electrolytic solution was filled. The water and HF concentration in the non-aqueous electrolytic solution was less than 50 ppm. As the non-aqueous electrolytic solution, there was used a solution obtained by dissolving  $\text{LiPF}_6$  in a 50/50 mixed solvent of EC and DEC in a concentration of 1 mole/liter. Each battery had a capacity of about 10 Ah after initial charge. After 24 hours, the non-aqueous electrolytic solution was picked from the battery and the water and HF concentration in the solution was measured. As a result of measurement, the concentration was 12,000 ppm.

6. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the

United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Date: January 17, 2003

Tobin Yablone

[Declarant's Signature]